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FOREST INSECT INVESTIGATIONS

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FOREST INSECT SURVEYS - SIERRA NATIONAL FOREST

SEASON OF 1936

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by
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TABLE OF CONTENTS

	<u>Page</u>
EXTENT AND TYPE OF SURVEY MADE	1
GENERAL INFESTATION CONDITIONS	2
HARRIS RANCH BURN	2
RECENT CONTROL WORK AND RESULTS	3
Oak Flat Project	4
Cascadel Project	4
Base Lake - Harris Ranch Burn Projects	5
INFESTATION CONDITIONS ON UNIT AREAS	5
Hugh Ryan Unit	6
Jackass Unit	6
Placer Unit	6
Rock Creek Unit	6
Cascadel Unit	6
Base Lake Unit	7
Fence Meadow Unit	7
Blue Canyon Unit	7
RECOMMENDATIONS	7
TABLE 1	8
MAP	9

FOREST INSECT SURVEYS - SIERRA NATIONAL FOREST

SEASON OF 1936

The annual insect survey of the Sierra National Forest was carried out by the Bureau of Entomology and Plant Quarantine during the months of September and October, 1936. The field work done in September was limited to the re-surveys of the permanent check plots in Chiquito Basin, at Cascadel, and at Ellis Meadow, and to a general reconnaissance of the infestation areas represented by these plots. An examination of the Harris Ranch Burn was also made during this period. The field crew consisted of G. R. Struble, J. S. Yuill and J. E. Patterson. Later, during October, the reconnaissance was extended to other parts of the forest which included Fence Meadow, Blue Canyon, Bass Lake, and Hugh Ryan. The Harris Ranch Burn was further examined and several beetle-killed trees were felled for study to determine the effects of fire injury and its relation to beetle attacks; and to secure quantitative data on brood development and subsequent emergence of adult beetles from fire-injured trees. J. E. Miller assisted in this latter work.

The cost of the survey was born entirely by the Bureau.

EXTENT AND TYPE OF SURVEY MADE

The region covered by the survey closely approximates that included in the survey of 1935, and is shown by infestation units on the map, page 9. In general it included all the merchantable pine stands and the principal recreational areas, but did not include the marginal stands on the western front or the cutover areas. The principal areas included are: Chiquito Basin, Rock Creek, and Ellis Meadow, Blue Canyon, Fence Meadow, Bass Lake, and Hugh Ryan.

No attempt was made to survey all the established permanent check plots. Previous experience has shown that all the current loss data cannot be secured in a cruise made the same year. These data are not completely available until the following spring. The plots omitted are those at Fence Meadow and in Blue Canyon. Since the evident 1936 seasonal losses were so light as to eliminate any necessity for control work it was decided to delay the cruise of these plots until the spring of 1937. However, the more remote check plots in Chiquito, and those at Cascadel and Ellis Meadow, were cruised since they are difficult to reach in early spring because of late snow conditions.

The total insect loss for the year on those areas where check plots were intensively cruised is computed from loss data secured on these plots. The amount of infestations on the other areas where check plots were not cruised is based on ocular observation and road traverse.

GENERAL INFESTATION CONDITIONS

In general, infestations of all species have greatly decreased from the status of previous years. The decline in the infestations, which has been in progress since 1933, culminated in 1936 in the lowest point reached since 1930.

On certain areas, Cascedal and Fence Meadow, increased late seasonal losses developed in the fall of 1935 which indicated a return to critical conditions. The increased infestations on these areas was sufficiently high to warrant control operations which were recommended. However, these infestations decreased to near normal status before the control work could be done in early spring of 1936. The projects were carried out as recommended but the number of infested trees found was much less than had been estimated the previous fall. The abrupt decline in these infestations occurred in late December and January and is believed to have resulted from the effects of unusually high temperatures during this period which accelerated brood development and emergence of adults that were later caught in winter conditions before attack on other trees could be made. The control work which was carried out on these areas further reduced the winter broods so that with the beginning of insect activity in the spring period the beetle population was at a very low status. These endemic infestations failed to increase in observable proportion during the year and resultant losses for 1936 aggregated only a fraction of the yearly loss during the past seven years.

The most outstanding characteristics of the beetle infestation at the close of the season in the late fall period is the uniformity of its distribution throughout the pine stands, and its extremely low status as compared with former years.

HARRIS RANCH BURN

During the year an epidemic infestation of the western pine beetle developed to alarming proportions in fire-injured trees on the Harris Ranch Burn located on the west flank of the Chowchilla Mountains. This epidemic built up from scattered winter brood trees and was confined almost exclusively to fire-injured timber, taking only an occasional tree outside the burned area. Several features of insect activity following this fire, which occurred in August, 1934, are of especial interest because of divergence from similar events on other burns of the same type. No pronounced insect activity occurred immediately following the fire. Later, during the season of 1935, many of the severely fire-injured trees loaded up with broods of Melanophila sp., a flathead barkborer. Trees infested with this species soon became so abundant that control work was undertaken during the following winter to prevent an epidemic. Concurrent infestation of the western pine beetle was not sufficiently evident to attract attention. In the spring of 1936 very few Melanophila broods could be found, whereas the western pine beetle showed evidence of becoming epidemic, and this status was actually reached by early summer. Thus the cycle of western pine beetle infestations in this burn has not followed the usual course of infestations in pine type

burns. Usually such infestations occur immediately following the fire and are dissipated within two years. On this burn, however, heavy concentration of attacks did not occur until the spring of 1936, the third season subsequent to the fire. This epidemic undoubtedly resulted from beetle broods which had been built up from incipient attacks made on fire-injured trees the previous fall and did not result from beetles attracted to the burn from outside sources. Because of the aberrant course, compared with events on other burns studied, it was not known prior to the late fall what results could be expected from the epidemic infestations of the spring and summer of 1936. In September of this season it was estimated from a general reconnaissance of the burned area that a total of 3,000 merchantable pine trees were killed by the beetles of the summer generations of 1936. Attacks on these trees were heavy, indicating a high beetle population on the area. Trees selected in these attacks had been only moderately to lightly fire-injured; or else showed no evidence of injury. Many infested trees around the outskirts of the burn showed little injury and were apparently in normal growing condition. Such trees ordinarily produce good broods of beetles, whereas broods developing in severely fire-injured trees usually suffer high mortality.

Early in the fall it became evident that the western pine beetle broods, which accounted for at least 90% of the infestation, were not developing normally and it was suspected that this condition would result in an early decline of the infestation. A later examination, made in December, substantiated this expectation that the epidemic would soon subside. Areas where the spring and summer infestations had been highly epidemic were again examined and the ratio of winter brood trees to summer brood trees was found to be as 1 to 100. This condition represented a decline in infestation of 99%, and showed that the epidemic had subsided from natural causes. Examination of the later summer brood trees showed that emergence had been very light and far below normal, indicating that high mortality had occurred in the egg and young larval forms since very few food burrows had progressed beyond the initial stages. These same conditions were found in both fire-injured and uninjured attacked trees.

Very few trees in the territory surrounding the burn had been attacked during the course of the epidemic. Only 6 winter brood trees were found within a radius of one mile on the west side of the burn, showing that the beetles had not spread from the burned area.

RECENT CONTROL WORK AND RESULTS

The amount of control work carried out during the year was limited to four small projects and was confined to local areas at Oak Flat (Pence Meadow), Gascadel, Bass Lake, and the Harris Ranch Burn. This control work has been reported by Supervisor M. A. Benedict.*

* Report - Annual Report on Insect Control Work Completed on the Sierra National Forest for the Season of 1936. By M. A. Benedict, Forest Supervisor, Northfork, California. October 23, 1936.

Oak Flat Project:

This project was recommended by the Bureau on the basis of the 1935 survey which showed an increasing infestation verging on epidemic losses. Control work was started March 16 and completed on April 4, 1936. Bad weather conditions caused a cessation of work during a part of this period. The Oak Flat CCC camp was used as headquarters. The spotting was done by the District Ranger and two experienced Forest Guards. Patterson and Salman of the Bureau spotted the 320 acre check plot in Section 7 and directed the treating crews at the beginning of the work. Treating labor was paid out of RRA and Edison Company Cooperative funds. The bulk of the infestation consisted of the western pine beetle in ponderosa pine. A few sugar pine trees infested by the mountain pine beetle were also treated.

A total of 2,500 acres were covered and 123 infested trees, containing a volume of 158,930 board feet were treated in 180 man days. The total cost of the project was \$1,390.28. The average cost per tree was \$10.69, and \$3.74 per MBM.

The estimated amount of infestation on this project area, as set up by the Bureau in the fall of 1935, was greatly in excess of the amount actually found when the control work was done. This condition was due to a sudden decline which occurred in the interval between the previous fall survey and the beginning of control work as is explained on page 2.

An examination of the control area made in October (end of the first season following control work) showed that the amount of reinfestation had not exceeded a total of 20 trees - a reduction of 84%.

Cascadel Project:

This project was started March 11 and continued through to March 21. All treating was done by CCC crews under the supervision of one BCW Foreman. The spotting was done by an experienced Forest Guard. The 320 acre Bureau Check Plot was spotted by Salman, West, and Bongberg. The western pine beetle caused the bulk of the infestation which was in ponderosa pine.

A total of 2,160 acres was treated. The total number of trees treated was 83, containing a volume of 92,210 board feet. A total of 155 man days was expended in this work. The cost was \$370.07, or an average cost per tree of \$4.45 and \$4.02 per MBM respectively.

The control area as originally set up by the Bureau included additional territory eastward to the Hogus Ranch which was not covered by the work because of reduced infestation. On this project, as well as at Oak Flat, the estimated infestation was greatly in excess of the amount treated.

A recruise of the check plot in September, 1936, gave the following comparative figures:

Plot loss in 1934	.29 trees
Plot Loss in 1935	.67 trees
Plot Loss in 1936 (incomplete). .	7 trees

Since losses on the check plot are directly comparable to the entire control area the total infestation is readily estimated and is placed at 15 trees per section.

Bass Lake - Harris Ranch Burn Projects:

Supervisor Benedict's report does not separate these two projects but lumps the statistical data since they were both part of the same general ERA project. However, the amount of infestation treated at Bass Lake and environs was not sufficiently high to warrant special consideration. This work was more a measure of sanitation on this recreational area than an attempt to stop a progressing infestation.

The work on both areas was begun on February 15 and was completed April 11.

All treating was done under ERA setup. Spotting of trees on both projects was done by an experienced Forest Guard. Trees treated at Bass Lake and environs were infested with the western pine beetle and flatheads. Those on the Harris Ranch Burn were infested principally with flatheads.

A total of 7,560 acres were treated on both projects. In all, 465 infested trees containing a volume of 484,430 board feet, were treated at a total cost of \$1,342.73 in 263 man days. The unit costs were \$2.84 per tree and \$2.77 per MBM.

The results of this control work are reflected in the present clean forests around Bass Lake and at Batterson. Very few infested trees appeared in these stands during 1936.

Developments subsequent to the control work on the Harris Ranch Burn are given elsewhere in this report. However, the western pine beetle epidemic which followed had no direct connection with the flathead infestation involved in the control work.

INFESTATION CONDITIONS ON UNIT AREAS

The same plan adopted for reporting current conditions on the infestation areas previously set up and used in last year's report is retained in the present report. The same outline map is again used to delineate these areas. The only change in the map, page 9, is the graphic presentation of areas where control work of the year was done.

A summary of the year's insect losses on the separate units is given in the table on page 8.

The loss estimates given for the separate units are based on plot cruises wherever such data were secured. In other cases estimates were secured from road traverse or from observation from vantage points.

1. Hugh Ryan Unit: The reduction in beetle infestations, principally the western pine beetle, which resulted from the control work in 1935 has continued on the downward course. The current loss will not average more than 5 infested trees per section. This loss is greatly scattered throughout the unit.

2. Jackass Unit: The trend of recent infestations in the upper Chiquito Basin is exemplified by the cruise data secured on the R. S. plot in this unit.

<u>Year</u>	<u>Loss in Trees per Section</u>	<u>Increase or Decrease</u>
1934	56	
1935	14	-75%
1936	4 (incomplete)	

These figures are, however, somewhat low as an index to the loss on the entire unit. The check plot is located on the best site. It is estimated that the current infestation will average about 20 trees per section.

3. Placer Unit: The forests of the southern part of the Chiquito Basin are decidedly inferior in quality and vigor and are more susceptible to insect attack. Past infestations have been high and a large percent of the stand has been lost through insect depredations. However, the current infestation is the lowest since continuous records have been kept. The plot cruises since 1934 show:

<u>Year</u>	<u>Loss in Trees per Section</u>	<u>Increase or Decrease</u>
1934	96	
1935	42	-56%
1936	0 (Incomplete)	

No trees were found in the September cruise that had been killed by beetles in 1936. However, the year's loss was not completely evident at that time and a cruise next year may reveal a few such trees. It is evident though that the current loss is far below normal. It will not exceed an average of 10 trees per section.

4. Rock Creek Unit: Barkbeetles were developing increased activity in these stands in 1935 and the infestation appeared to be approaching critical conditions. At that time it was suggested that the area be kept under surveillance in order to detect any epidemic tendencies. These did not materialize but conversely a reduction in losses occurred in 1936. The current loss is estimated to be about 20 trees per section.

5. Bascondel Unit: Insect losses in the fall of 1935 were of epidemic character and local grouping tendencies indicated further increase. Control was recommended which was subsequently carried out in the winter of 1936. There was an immediate reduction of 73% in losses following this work. Cruise of the check plot in September, 1936, showed that reinfestation during the year had amounted to a total of 7 trees; or about 15

infested trees per section. No further control work is recommended for the immediate future.

6. Bass Lake Unit: The recreational usage of the forests surrounding Bass Lake subject them to additional insect hazard which is less prominent in commercial stands. Sanitation requirements are higher and individual trees also assume greater value. For these reasons insect losses should be kept down to the barest minimum. Success in this direction has been largely attained during past years by conducting annual control work wherever needed. The results obtained have fully justified this work and its continuance is highly recommended. The control work done last spring was effective in maintaining a clean stand throughout the year, and very few dead trees were evident in September.

7. Fence Meadow Unit: Recommended control work was carried out in the early spring period of 1936, and is reported in summarized form elsewhere in this report. An examination of the control area made in October showed that the maximum loss which had occurred throughout the season following control had not exceeded a total of 20 trees on the entire area.

8. Blue Canyon Unit: Infestation trends on this unit have been generally downward for the past 5 years. There was an increase in beetle-caused losses in 1935, although these conditions were far from being epidemic. A decrease of over 50% occurred in 1936. The current infestation is estimated to amount to an average of 20 trees per section, the lowest point reached since 1929.

RECOMMENDATIONS

No major control projects are recommended in any of the infestation units of this forest. Infestations are subnormal and insect depredations are at a minimum. The western pine beetle is expected to continue in active but endemic status in the sub-marginal stands of certain units; Bass Lake, Hugh Ryan, and Cascadal.

A small amount of control work is advisable at Bass Lake to keep the beetle losses down to the lowest possible point consistent with present methods and the special requirements of recreational areas. Control work on this unit is best done during late winter and spring periods.

Epidemic conditions on the Sarris Ranch Burn have been supplanted by subnormal losses, and since the infestation has not spread to adjacent stands no control work is recommended on this area.

TABLE 1

ESTIMATED INSECT LOSSES IN 1936 - PER SECTION AND PER UNIT - SIERRA NATIONAL FOREST

Unit	Timbered Unit Tree			Per Section				Per Unit				Loss per			Increase or Decrease since 1935
	Secs.	Acres	Volume	Trees	Volume B.M.	Trees	Volume B.M.	Acres B.M.	Acres B.M.	Loss per	Loss per	1936	1935		
Hugh Ryan	8	5,000	1,200	5	6,000	40	45,000	10	23						-64%
Jackess	16	10,200	1,800	20	36,000	320	576,000	56	98						-44%
Placer	25	16,000	850	10	8,500	250	212,500	14	46						-70%
Rock Creek	16	10,200	1,200	20	24,000	320	384,000	38	66						-43%
Cascadel	12	7,600	700	15	10,500	180	126,000	17	132						-87%
Bass Lake	14	8,900	600	5	3,000	70	42,000	5	14						-64%
Fence Meadow	12	7,600	2,300	2	4,600	20	46,000	6	254						-98%
Blue Canyon	19	6,400	1,600	20	32,000	200	320,000	50	125						-60%
Totals	113	71,900		97	124,600	1,400	1,754,000	195	763						
Total Averages	14	8,988	1,280	12	15,600	175	219,300	24	95						-75%

